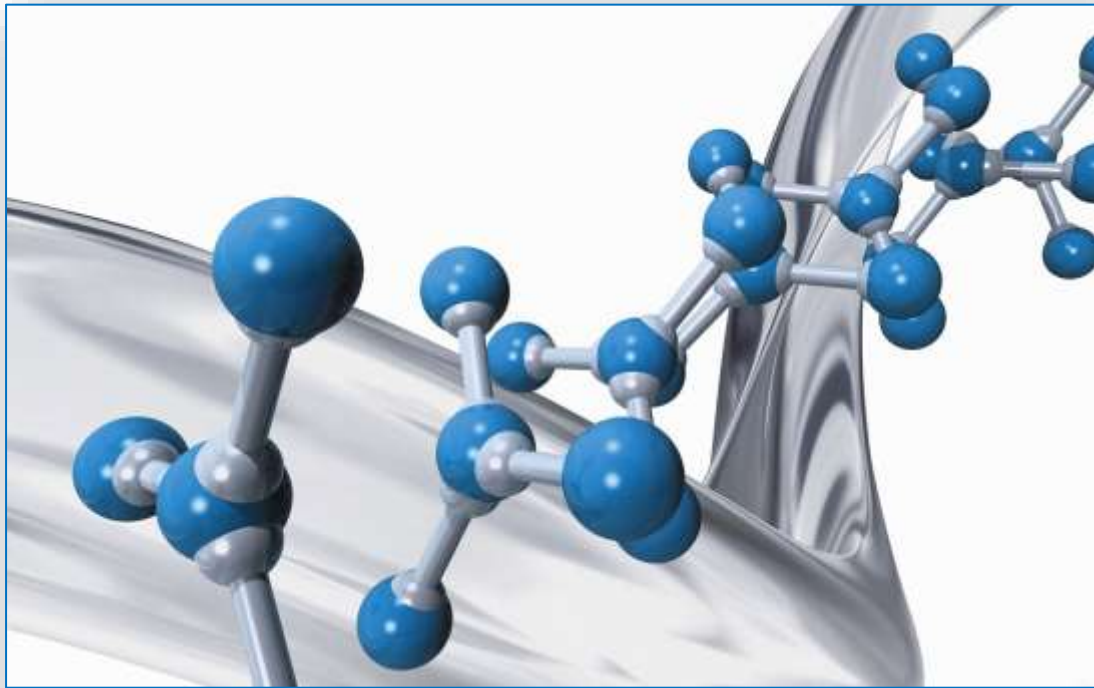




PCE150

Basic Principles and Calculations in Chemical Engineering

Course Introduction:

Basic Principles and Calculations in Chemical Engineering, goes far beyond traditional introductory chemical engineering topics, presenting applications that reflect the full scope of contemporary chemical, petroleum, and environmental engineering. Celebrating its fiftieth Anniversary as the field's leading practical introduction, it has been extensively updated and reorganized to cover today's principles and calculations more efficiently, and to present far more coverage of bioengineering, nano-engineering, and green engineering.

Offering a strong foundation of skills and knowledge for successful study and practice, it guides participants through formulating and solving material and energy balance problems, as well as describing gases, liquids, and vapors. Throughout, introduce efficient, consistent, student-friendly methods for solving problems, analyzing data, and gaining a conceptual, application-based understanding of modern chemical engineering processes.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- ✓ Appreciate the history of chemical engineering and bioengineering
- ✓ Understand the types of industries that hire chemical and bioengineers
- ✓ Appreciate the diversity of the types of jobs in which chemical and bioengineers engage
- ✓ Understand some of the ways in which chemical and bioengineers can contribute in the future to the resolution of certain of society's problems

Who Should Attend?

This course is intended for chemical engineers, process engineers, bio-engineers as well as reasearch & development staff.

Course Outline:

Day 1:

Introduction

- What are the Chemical Engineering and Bio-engineering?
- Introduction
- A brief History of Chemical Engineering
- Where do Chemical and Bio-engineering work?
- Future Contributions of Chemical and Bio-engineering
- Conclusion

Introductory Concepts

- Systems of Units
- Conversion of Units
- Dimensional Consistency
- Significant Figures
- Validation of Results
- The Mole and Molecular Weight
- Choosing a Basis
- Density and Specific Gravity
- Concentration
- Temperature
- Pressure and Hydrostatic Head
- Flow Rate

Day 2:

Material Balances

- Introduction to Material Balances
- A General Strategy for Solving Material Balance Problems

Material Balance without Reaction

- Materials Balances Involving Reactions
- Stoichiometry
- Terminology for Reaction Systems
- Species Mole Balances
- Element Material Balances
- Material Balances for Combustion Systems

Day 3:

Material Balances for Multi-Unit Systems

- Primary Concepts
- Sequential Multi-Unit Systems
- Recycle Systems
- Bypass and Purge
- The Industrial Application of Material Balances

Ideal and Real Gases

- Ideal Gases
- Real Gases: Equations of State

- Real Gases: Compressibility Charts
- Real Gas Mixtures

Multiphase Equilibrium

- Introduction
- Phase Diagrams and the Phase Rule
- Single Component Two-Phase Systems (Vapor Pressure)
- Two Component Gas/Single Component Liquid Systems
- Two Component Gas/Two Component Liquid Systems
- Multicomponent Vapor-Liquid Equilibrium

Day 4:

Energy Balances

- Terminology Associated with Energy Balances
- Types of Energy to be Included in Energy Balances
- Energy Balances without Reaction

Energy Balances: How to account for Chemical Reaction

- The Standard Heat (Enthalpy) of Formation
- The Heat (Enthalpy) of Reaction
- Integration of Heat of Formation and Sensible Heat
- The Heat (Enthalpy) of Combustion

Day 5:

Humidity (Psychrometric) Charts and their use

- Terminology
- The Humidity (Psychrometric) Chart
- Applications of the Humidity Chart

Supplemental Material

Analysis of the Degrees of Freedom in Steady-State Processes

Heats of Solution and Mixing

The Mechanical Energy Balance

Liquids and Gases in Equilibrium with Solids

Solving Material and Energy Balances using Process Simulators (Flowsheeting Codes)

Unsteady-State Material and Energy Balances

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Fees:

To be advised as per the course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session